Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.

Reserve
1.96
R31Fcm



LIBRARY
FEB 24 1959
U. S. DEPARTMENT OF AGRICULTURE

FEDERAL - STATE - PRIVATE COOPERATIVE

SNOW SURVEY and WATER SUPPLY FORECASTS for COLORADO, RIO GRANDE, PLATTE and ARKANSAS DRAINAGE BASINS

UNITED STATES DEPARTMENT of AGRICULTURE···SOIL CONSERVATION SERVICE,
and
COLORADO AGRICULTURAL EXPERIMENT STATION,
STATE ENGINEER of COLORADO
and STATE ENGINEER of NEW MEXICO

Data included in this report were obtained by the agencies named above in cooperation with the U.S. Forest Service, National Park Service, Bureau of Reclamation, State Engineers of Utah and Wyoming; and other Federal, State and private organizations.

AS OF
FEB. 1, 1959

UNITED STATES DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE

TO RECIPIENTS OF COOPERATIVE SNOW SURVEY AND WATER SUPPLY FORECAST REPORTS:

The climate of the cultivated and populated areas of the West is characterized by relatively dry summer months. Such precipitation as occurs falls mostly in the winter and early spring months when it is of little immediate benefit to growing crops. Fortunately, most of this precipitation falls as mountain snow which stays on the ground for months, melting later to sustain streamflow during the period of greatest demand during late spring and summer. Thus, nature provides in mountain snow an imposing water storage facility.

The amount of water stored in mountain snow varies from place to place as well as from year to year and accordingly, so does the runoff of the streams. The best seasonal management of variable western water supplies results from fore-knowledge of the runoff.

A snow survey consists of a series of about ten samples taken with specially designed snow sampling equipment along a permanently marked line, about 1000 feet in length, called a snow course. The use of snow sampling equipment provides snow depth and water equivalent values for each sampling point. The average of these values is reported as the snow survey measurement for a snow course.

Snow surveys are made monthly or semi-monthly beginning in January or February and continue through the snow season until April, May or June. Currently more than 1300 western snow courses are measured each year. These measurements furnish the key data for water supply forecasts.

By relating snow survey measurements taken over a period of years to spring-summer runoff during the same period, relationships have been developed which make it possible to forecast seasonal runoff several months in advance of occurrence. In order to make a forecast, once a forecast relationship has been developed, the maximum snow water content at previously selected key snow courses is usually entered in the forecast relationship. More accurate forecasts are often obtained when other factors such as soil moisture, base flow and spring precipitation are considered and included in the forecast relationships.

Listed below are the Federal-State-Private Cooperative Snow Survey and Water Supply Forecast reports available for the West which contain detailed information on snow survey measurements, streamflow forecasts, reservoir storage, soil moisture and other guide data to water management and conservation decisions.

PUBLISHED BY SOIL CONSERVATION SERVICE

REPORTS	ISSUED	COOPERATING WITH	LOCATION
RIVER BASINS			
Colorado, Rio Grande and Arkansas	Monthly (Feb.-May)	Colo. Exp. Station Colo. State Engineer New Mexico State Engineer	Ft. Collins, Colo.
Columbia *Includes Alaska*	Monthly (Jan.-May)	Idaho State Engineer	Boise, Idaho
Upper Missouri	Monthly (Feb.-May)	Mont. Agr. Exp. Station	Bozeman, Montana
West-Wide	(Oct. 1, Apr. 1 and May 1)	Cooperators	Portland, Oregon
STATES			
Arizona	Semi-Monthly (Jan. 15-Apr. 1)	Salt R. Valley Water Users Association	Phoenix, Arizona
Nevada	Monthly (Feb.-Apr.)	Nevada State Engineer	Reno, Nevada
Oregon	Monthly (Jan.-May)	Ore. Agr. Exp. Station	Portland, Oregon
Utah	Monthly (Jan.-May)	Utah State Engineer Utah Agr. Exp. Station	Salt Lake City, Utah
Washington	Monthly (Feb.-May)	Wash. State Dept. of Conservation	Spokane, Washington
Wyoming	Monthly (Feb.-June)	Wyoming State Engineer	Casper, Wyoming

Copies of the various reports may be secured from: Head, Water Supply Forecasting Section
Soil Conservation Service
209 S.W. 5th Avenue, Portland 4, Oregon

PUBLISHED BY OTHER AGENCIES

OTHER SNOW SURVEY REPORTS			
British Columbia	Monthly (Feb.-June)	Comptroller, Water Rights Br., Dept. of Lands and Forests. Parliament Bldgs. Victoria, B.C.	
California	Monthly (Feb.-May)	California Department of Water Resources. Sacramento, California	

FEDERAL-STATE COOPERATIVE

SNOW SURVEYS AND WATER SUPPLY FORECASTS

for

COLORADO RIVER, PLATTE RIVER ARKANSAS RIVER AND RIO GRANDE DRAINAGE BASINS

Issued

February 1, 1959

Report Prepared By
Homer J. Stockwell, Snow Survey Supervisor
Fort Collins, Colorado
Jack N. Washichek, Assistant Snow Survey Supervisor
Fort Collins, Colorado

United States Department of Agriculture
Soil Conservation Service
and
Colorado Agricultural Experiment Station
Fort Collins, Colorado
and
State Engineer of Colorado
Denver, Colorado
and
State Engineer of New Mexico
Santa Fe, New Mexico

Issued By

Kenneth W. Chalmers
State Conservationist
Soil Conservation Service

Sherman S. Wheeler, Director
Colorado Agricultural
Experiment Station

J. E. Whitten
State Engineer
State of Colorado

S. E. Reynolds
State Engineer
State of New Mexico

General Series Paper No. 701
Colorado Agricultural Experiment Station

Snow Survey measurements in Wyoming, Utah, and Arizona are supplied by Snow Survey Supervisors, Soil Conservation Service, in those states.

WATER SUPPLY OUTLOOK
COLORADO, RIO GRANDE, PLATTE AND ARKANSAS DRAINAGE BASINS

February 1, 1959

WATER SUPPLY OUTLOOK AS OF FEBRUARY 1 IS AVERAGE OR BETTER EAST OF THE CONTINENTAL DIVIDE IN COLORADO AND ON YAMPA AND WHITE RIVERS IN NORTHWEST COLORADO. SOME DEFICIENCY IS EXPECTED FOR THE COLORADO RIVER AND GUNNISON RIVER. SNOWFALL TO DATE IS NEAR THE LOWEST OF RECORD ON THE HEADWATERS OF THE DOLORES, SAN JUAN AND RIO GRANDE. OUTLOOK IS POOR ALONG RIO GRANDE IN NEW MEXICO EXCEPT BELOW ELEPHANT BUTTE RESERVOIR.

SNOW COVER AND RUNOFF PROSPECTS ARE VERY LOW IN ARIZONA. STORED WATER IS WELL ABOVE AVERAGE AND WILL SUPPLY A MAJOR SEGMENT OF 1959 WATER REQUIREMENTS.

COLORADO. Snow pack on watersheds east of the Continental Divide is normal or better. Carryover storage is above average particularly in larger reservoirs. Soil moisture conditions in irrigated areas are good. If snowfall during the remainder of the season is near normal or better, irrigation water may be expected to be reasonably adeauate along the Arkansas and South Platte Rivers, but not plentiful.

West of the Continental Divide the outlook is less favorable. Winter snowfall has been deficient following an extensive drouth during the mid-summer and fall months. Snow water contents measured on Grand Mesa and on the headwaters of the Dolores, San Juan and Rio Grande drainages on February 1 were among the lowest of record since snow surveys were started in 1936. Unless there is a decided improvement in the rate of snow fall for the remainder of the season, runoff in these streams and their tributaries will be extremely low in 1959. The flow of the Colorado River is expected to be about three-quarters of normal and somewhat less for the Gunnison River at Grand Junction.

NEW MEXICO. The flow of the Rio Grande will be about one-half of normal through New Mexico. The deficiency of snow cover in Colorado extends over Northern New Mexico. The water supply outlook below Elephant Butte is near average because of storage. In Elephant Butte and Caballo reservoirs there is now stored 1, 150, 000 acre-feet or about 110 percent of the average for 1938-52. The water supply outlook for the Tucumcari Project on the Canadian River and for the Carlsbad Project on the Pecos River is good because of above normal carryover storage.

ARIZONA. There is practically no snow cover in the mountains of Arizona as of February 1. Soil moisture at high elevations is relatively good because of heavy rains during the fall months. Storage on the Salt and Gila Rivers is well above average and will supply sufficient water for the major irrigated areas.

UTAH. A record low snow pack for February 1 exists on the watersheds of Central and Southern Utah. Streamflow in this area is expected to be less than 50 percent of average in 1959. On Green River tributaries in Northern Utah the outlook is less than normal but not quite as deficient as in the south. Only in irrigated areas served by large reservoirs will reasonably adequate water supplies be available this year.

COOPERATIVE SNOW SURVEYS
SUMMARY OF SNOW MEASUREMENTS
February 1, 1959

WATERSHEDS	No. of Courses Averaged	Years of Record	Water Content as percent of 1958	Water Content as percent of Avg.
ARKANSAS RIVER				
Arkansas River	6	18-23	93	89
COLORADO RIVER				
Colorado River*	13	17-22	98	96
Roaring Fork	3	13-23	78	72
Plateau Creek	2	14-22	46	66
Yampa River	3	17-23	74	93
White River				
Gunnison River	8	10-23	55	62
Dolores River	3	10-20	35	33
Green River (Wyo.)	--	--	--	--
San Juan River	6	8-19	34	34
Animas River	4	8-22	36	40
Gila River	9	11-21	--	---
Salt River	7	8-21	--	--
Verde River	6	11-13	--	--
Little Colo. River	5	11-21	--	--
Williams River	3	10-13	--	--
Lower Colo. River	4	11-12	--	--

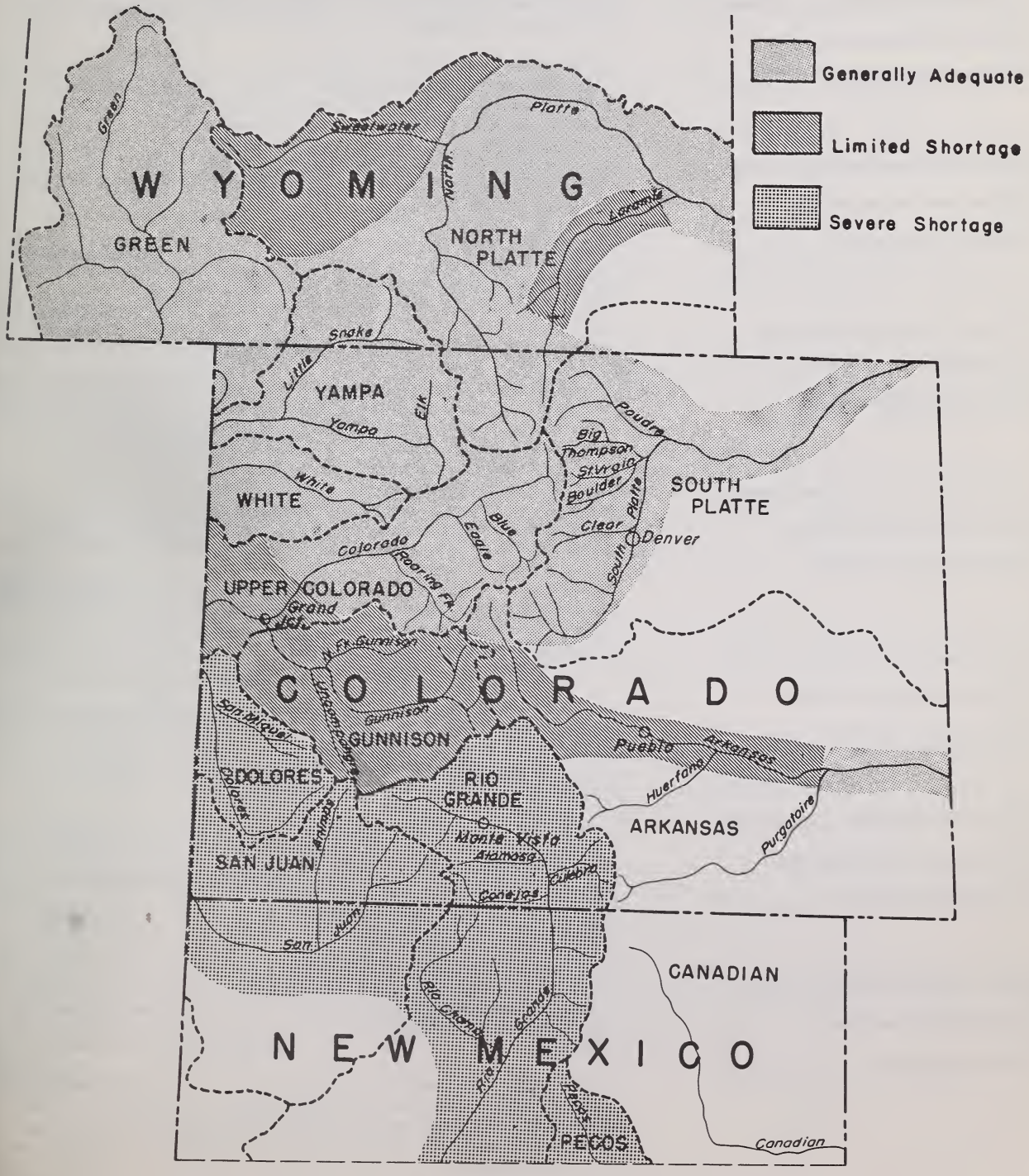
*Above Glenwood Springs

WATERSHEDS	No. of Courses Averaged	Years of Record	Water Content as percent of 1958	Water Content as percent of Avg.
PLATTE RIVER				
Sweetwater	2	17	76	55
North Platte River	13	8-21	92	93
Laramie River	7	12-22	116	112
South Platte River**	2	9-20	100	119
Poudre River	7	8-20	114	123
Big Thompson River	4	8-20	121	99
St. Vrain River	3	9-21	174	115
Boulder Creek	2	9-20	193	192
Clear Creek	5	7-19	119	94
RIO GRANDE				
Rio Grande (Colo.)	4	10-20	39	44
Rio Grande (N.M.)	5	17-20	63	71
Conejos River	1	20	87	65
Chama River	4	17-20	61	50
Pecos River	2	17-20	50	44
Canadian River	2	17-20	58	74
Alamosa River	2	14-19	39	38

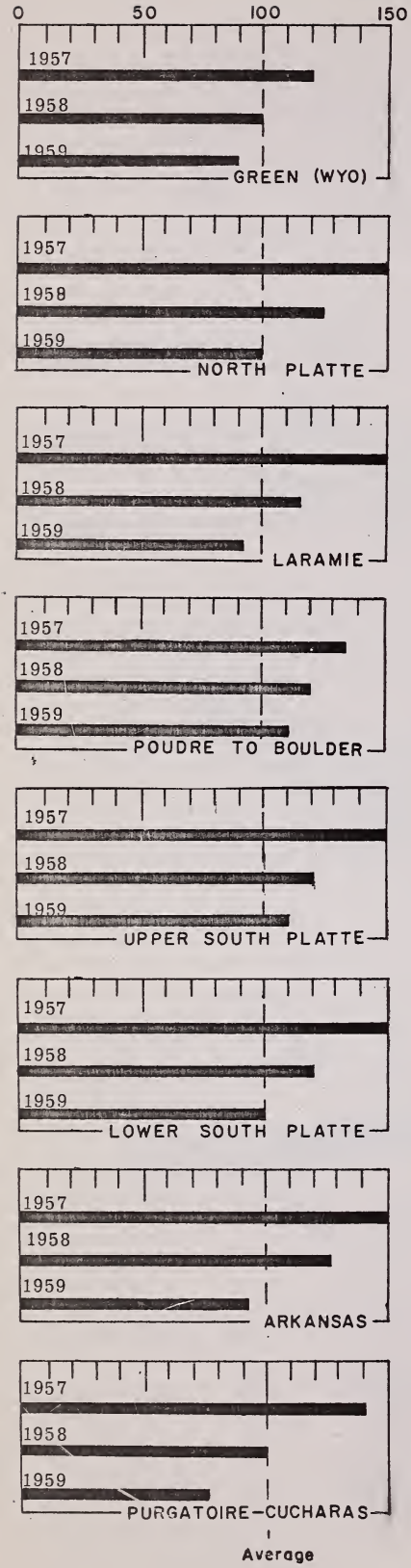
**Above Denver

WATER SUPPLY OUTLOOK

THE MAP ON THIS PAGE INDICATES THE MOST PROBABLE WATER SUPPLY AS OF THE DATE OF THIS REPORT. ESTIMATES ASSUME AVERAGE CONDITIONS OF SNOW FALL, PRECIPITATION AND OTHER FACTORS DURING THE SPRING AND EARLY SUMMER MONTHS. AS THE SEASON PROGRESSES ACCURACY OF ESTIMATES IMPROVE. IN ADDITION TO EXPECTED STREAMFLOW, RESERVOIR STORAGE, SOIL MOISTURE IN IRRIGATED AREAS, AND OTHER FACTORS ARE CONSIDERED IN ESTIMATING WATER SUPPLY. ESTIMATES APPLY TO IRRIGATED AREAS ALONG THE MAIN STREAMS AND MAY NOT INDICATE CONDITIONS ON SMALL TRIBUTARIES.



WATER SUPPLY OUTLOOK



THE BAR CHARTS ON THIS AND THE NEXT PAGE REPRESENT GRAPHICALLY THE MOST PROBABLE WATER SUPPLY OUTLOOK FOR 1959 AS COMPARED TO 1957 AND 1958. STREAMFLOW AND OTHER FACTORS FOR 1958 ARE PARTIALLY ESTIMATED AS FULL DATA ON WATER SUPPLY CONDITIONS ARE NOT YET AVAILABLE. ESTIMATES OF PAST CONDITIONS AND FORECASTS HAVE BEEN MADE BY THE AUTHORS OF THIS REPORT IN CONSULTATION WITH WATER OFFICIALS.

GREEN: The flow of the Green River in Wyoming will be less than average in 1959 but should be adequate to meet local needs. Snow pack near the headwaters in Wyoming is relatively heavier than near the Utah, Wyoming border.

NORTH PLATTE: Water supply on the North Platte should meet irrigation water demands for next year. Inflow to Seminoe Reservoir will probably be slightly less than normal as indicated by the February 1 snow measurements. Storage in the major reservoirs in Wyoming including the new Glendo Reservoir is now about 1,350,000 acre-feet, nearly twice normal and only slightly less than for this date in 1958. Soil moisture conditions in Eastern Wyoming are fair. In Western Nebraska soil moisture is reported as good.

LARAMIE: Snow cover on the headwaters of the Laramie River in Colorado and Wyoming is a little above normal and a year ago. Soil moisture conditions under the snow in the mountains as well as in the irrigated areas are poor. Summer streamflow will probably be a little less than normal. Reservoir storage is less than one-half of that available a year ago, totaling 29,000 acre-feet.

POUDRE-BOULDER: Water supply outlook for the Poudre, Big Thompson and St. Vrain Rivers and Boulder Creeks will be near normal for 1959. Mountain snow pack ranges from normal to 120 percent of normal, with a small area on Boulder Creek at about 190 percent of normal. Storage in smaller irrigation reservoirs is near average and somewhat less than for a year ago. In addition to natural streamflow, there is a total of about 140,000 acre feet in Horsetooth and Carter Lakes and about 280,000 acre feet in Granby for the Colorado-Big Thompson project. A full allotment of this supplemental water will be available.

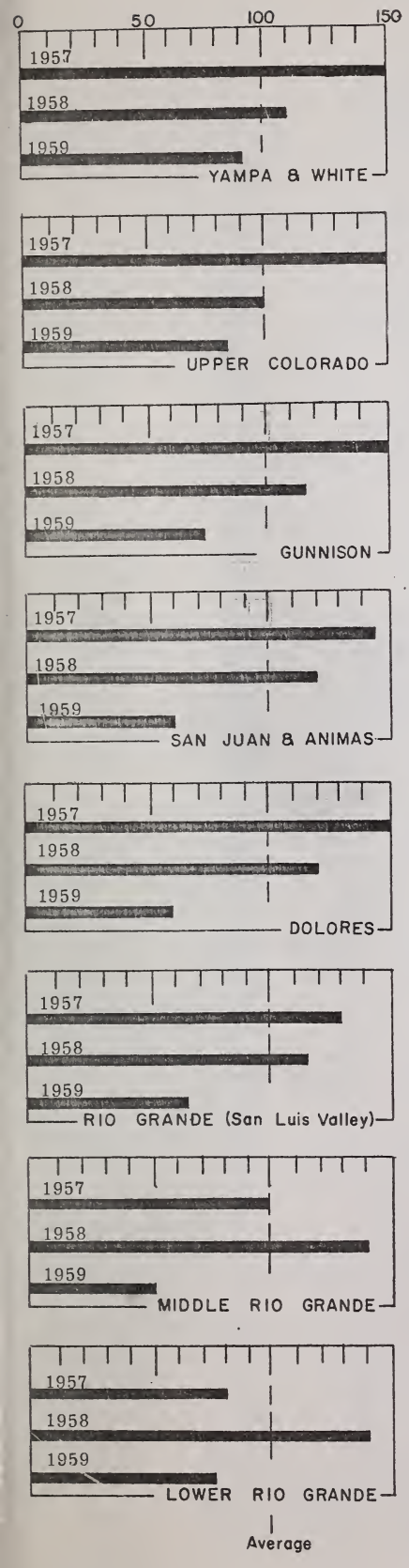
UPPER SOUTH PLATTE: Early season snow and soil moisture measurements indicate that the summer flow of the Upper South Platte and Clear Creek will be near average. Municipal reservoirs of the City of Denver may be expected to fill again this year. Storage in irrigation reservoirs is a little less than for a year ago but above normal.

LOWER SOUTH PLATTE: The water supply outlook for the lower South Platte is good. Winter streamflow is above normal and larger reservoirs are expected to fill again this year. Summer streamflow will probably be near average but this is largely dependent on rainfall and irrigation water demands on the tributaries during the irrigation season.

ARKANSAS: Seasonal snowfall has been near normal at Tennessee Pass and Fremont Pass with about 80 percent normal snowfall near Monarch Pass and along the Sangre de Cristo range to the south. Mountain soils are dry. Summer flow of the Arkansas River main stem is forecast at about 80 percent of normal at Salida. Flow will be less at downstream points assuming normal summer rainfall. Except for Twin Lakes, storage is better than average but not as good as for 1958. Soil moisture conditions are good for the lower valley. The general water supply outlook for the irrigated area above John Martin Reservoir is near average. With nearly 250,000 acre-feet stored in John Martin Reservoir, the outlook for irrigation water supply below the reservoir is excellent.

PURGATOIRE-CUCHARAS: The flow of the Huerfano, Cucharas and Purgatoire Rivers will be in the range of 50 to 70 percent of normal based on present snow measurements. Soil moisture conditions in valley areas are good. Much of the water supply outlook depends on later precipitation.

WATER SUPPLY OUTLOOK



YAMPA-WHITE: Snow pack is near normal on the headwaters of the Yampa River and the White River. Soil moisture conditions in valley areas are fair. Mountain soils are dry. Water supply is expected to be adequate to meet demands on these streams this year.

UPPER COLORADO: Snow pack is about normal for this date on the Colorado River above Glenwood Springs and about 70 percent of normal on the Roaring Fork. Summer stream flow is expected to be less than normal. There may be late season shortage along small tributaries where there is no storage. Soil moisture conditions are only fair reflecting the summerand fall drouth.

GUNNISON: The water supply outlook for irrigated areas served by the Gunnison, North Fork, and Uncompahgre Rivers is only fair for next year. Snow pack ranges from about 50 to 70 percent of normal with better snow conditions near the Continental Divide. The Grand Mesa and San Juan mountains are most deficient in snow pack and mountain soil moisture. Storage in Taylor Park Reservoir is below normal and 60 percent of that stored on February 1, 1958.

SAN JUAN-ANIMAS: Snowfall to date is only about one-third of normal. Mountain soils are dry. These two factors combine to indicate a poor water supply outlook for the San Juan and its tributaries for 1959. Only unusually heavy snowfall for the remainder of the snow season can produce normal summer runoff.

DOLORES: Water supply outlook is similar to the adjacent San Juan watershed. Water shortage may be expected for the Montezume Irrigation District served by the Dolores River. Storage is less than normal and a year ago.

RIO GRANDE (San Luis Valley): Snowfall has been about one-third of normal. Water supply outlook for 1959 is poor for San Luis Valley in direct contrast to the 1957 and 1958 water years. As of this time the water shortage will probably not be as severe as during the drouth period. of 1954-56. Reservoir storage and groundwater levels are improved over that period. Streamflow will probably be in the range of 60 to 70 percent of normal. Valley soil moisture conditions are fair.

MIDDLE RIO GRANDE (New Mexico): The deficiency of snowfall to date in Southern Colorado extends into Northern New Mexico. Mountain soils are dry. Storage is less than normal. The water supply outlook through the middle Rio Grande Valley and for the small tributaries in Northern New Mexico is poor.

LOWER RIO GRANDE: Inflow to Elephant Butte during the summer season of 1959 is expected to be less than half of normal. Storage in Elephant Butte and Caballo Reservoirs totals about 1,150,000 acre-feet which is about 110 percent of normal and greater than for any recent year. Even if inflow is low, total water supply should meet average demands this year.

Water supply outlook is good for the Tucumcari Project on the Canadian River and for the Carlsbad Project on the Pecos River. As with the Lower Rio Grande, streamflow is expected to be below normal but carryover storage is well above normal and a year ago.

FOR DETAILS ON WATER SUPPLY CONDITIONS ON THE COLORADO RIVER DRAINAGE IN UTAH AND ARIZONA, NOT LISTED OR DISCUSSED IN THIS REPORT, REFERENCE SHOULD BE MADE TO THE STATE SNOW REPORT FOR UTAH AND ARIZONA (see inside cover).

AVAILABLE SOIL MOISTURE IN INCHES*

February 1, 1959

DRAINAGE BASIN AND STATION	Profile Depth	Soil Moisture Content in Inches Cap. In.	1959 In.	1958 In.	1957 In.
NORTH PLATTE					
Columbine Lodge	48	8.0	0.2	4.5	0.1
Willow Creek	48	7.0	0.7	6.9	2.2
Windy Point					
Barrett					
SOUTH PLATTE					
Red Feather	48	6.0	0.1	1.5	0.4
Chambers Lake	48	7.0	0.7	3.4	2.2
Deer Ridge	48	6.0	0.3	1.0	0.7
Hidden Valley	48	8.0	0.8	5.3	1.7
Longs Peak	48	7.0	0.2	0.8	0.5
University Camp	48	7.0	0.3	1.4	0.8
Berthoud Falls	48	6.0	2.6	3.1	0.4
Alma	48	7.0	0.3	4.4	0.7
Kenosha Pass	48	7.0	0.2	6.3	0.9
ARKANSAS					
Leadville	48	7.0	0.5	2.7	1.2
Lake Creek	48	6.0	2.9	5.1	3.0
Garfield	48	7.0	2.8	6.4	3.4
ROARING FORK					
Placita	48	8.0	0.1	1.2	0.9
Maroon	48	8.0	0.1	2.9	0.4
UPPER COLORADO					
Vail Pass	48	8.0	0.6	5.4	0.3
Ranch Creek	48	7.0	4.3	5.8	1.7
Hairpin	48	8.0	0.5	6.4	0.0
Vasquez	48	7.0	3.8	5.9	1.5
Gore Pass	48	7.0	0.1	1.9	0.7
Blue River	48	7.0	0.4	6.8	0.3
GUNNISON					
Monarch Pass	48	8.0	7.3	7.2	3.8
RIO GRANDE (Colo.)					
Bristol View	48	7.0	--	--	--
Wolf Creek Pass	48	9.0	0.5	6.1	0.7
River Springs	48	7.0	0.3	1.9	2.5
La Veta Pass	48	8.0	0.1	2.4	2.8
RIO GRANDE (N.M.)					
Red River	48	7.0	0.5	6.4	0.6
Tres Ritos	48	7.0	1.1	4.6	0.5
Bateman	48	8.0	1.7	7.6	4.0
Chamita	48	8.0	1.8	4.3	1.2

*Measurements made in November 1958. Three to six years of record. Interpretation methods are tentative.

STATUS OF RESERVOIR STORAGE
February 1, 1959

RESERVOIR	USABLE CAPACITY 1000 A.F.	USABLE STORAGE 1000 A.F. 1959	1958	15-yr. Avg. 1938-52
NORTH PLATTE DRAINAGE				
Kingsley	1900.0	1403.2	925.4	1087.7*
Sutherland	70.0	58.6	73.2	47.6
Minatare	58.8	33.2	33.8	23.4
Alcova	190.3	87.8	188.5	82.3
Seminoe	1011.6	818.4	613.9	381.3
Guernsey	44.0	32.7	28.0	34.4
Pathfinder	1015.9	67.3	654.9	348.9
Kortes	4.7		4.7	-- *
SOUTH PLATTE DRAINAGE				
Windsor	18.6	11.0	13.5	8.2
Cache la Poudre	9.5	8.2	8.3	5.5
Fossil Creek	11.6	7.0	7.1	6.1
Terry Lake	8.2	4.4	5.1	3.9
Halligan	6.4	4.3	4.7	1.5
Chambers Lake	8.8	1.7	1.9	2.4
Cobb Lake	34.3	17.8	19.0	4.6
Black Hollow	8.0	3.7	3 3	3.3
Carter	108.9	59.2	84.3	-- *
Horsetooth	143.5	77.7	98.7	--
Lake Loveland	14.3	9.7	7.6	4.6
Boyd Lake	44.0	42.2	42.2	15.4
Lone Tree	9.2	5 9	7.5	5.3
Mariano	5.4	4.3	5.0	1.6
Union	12.7	8.6	12.4	6.8
Eleven Mile	81.9	97.8	92.5	75.5
Cheesman	79.0	56 1	79.1	55.9
Marston	18.9	15.1	13.9	14.4
Antero	33.0	15.7	17.8	13.6
Gross	43.1	18.7	37.6	-- *
Barr Lake	32.2	14.2	24.2	17.7
Milton	24.4	15.3	15.4	9.2
Standley	18.5	7.4	12.8	8.7
Marshall	10.3	1.8	6 6	2.1
Horse Creek	20.6	9.5	12.5	7.6
Riverside	57.5	35.9	52.2	38.5
Empire	37.7	28.4	30.4	21.1
Jackson Lake	35.4	28.3	26.5	27.2
Prewitt	32.8	16.7	25.0	19.7
Point of Rocks	70.0	61.7	65.1	43.8
Julesburg	28.2	20.5	19 8	20.3

* Shorter periods

RESERVOIR	USABLE CAPACITY 1000 A.F.	USABLE STORAGE 1000 A.F. 1959	1958	15-yr. Avg. 1938-52
ARKANSAS DRAINAGE				
Twin Lakes	57.9	12.7	38.3	24.7
Sugar Loaf	17.4	5.5	15.2	7.8
Clear Creek	11.4	4.8	11.0	5.5
Meredith	41.9	15.6	27.0	15.0
Horse Creek	26.9	2.5	22.6	7.9
Adobe Creek	61.6	29.1	58.7	24.2
Cucharas	40.0	6.0	17.7	5.9
John Martin	655.0	244.4	261.6	59.4*
Great Plains	150.0	103.9	41.3	44.2
Model	15.0	3.7	6.1	3.1
Conchas (NM)	600.0	357.7	237.0	260.5*
W C Austin (Okla)	151.0			
COLORADO DRAINAGE				
Taylor Park	106.2	51.4	83.3	60.1
Vallecito	126.3	45.2	61.7	40.8*
Groundhog	21.7	5.0	15.0	7.8*
Granby	465.6	287.3	320.8	-- *
Green Mountain	146.9	70.1	105.1	73.0*
Lake Mead	27,207.0	21,515.0	20,001.3	19,438.0
Lake Havasu	688.0	546.3	565.9	554.6
Lake Mohave	1,810.3	1,678.2	1541.8	1045.2
RIO GRANDE (COLO) DRAINAGE				
Rio Grande	45.8	5.1	40.9	14.1
Santa Maria	45.0	7.5	14 5	8.9
Sanchez	103.2	25.4	35.0	12.3
Terrace	17.7	2.2	--	2.8
Continental	26.7	1.7	11.0	6.9
Platoro	60.0	34.0	30.4	-- *
RIO GRANDE (N. M.) DRAINAGE				
Elephant Butte	2,273.7	981.1	779.1	892.6
Caballo	365.0	180.6	49.5	173.3
El Vado	226.0	2.7	13.2	58.8
Alamogordo	128.0	123.6	101.0	63.3
McMillan-Avalon	37.0	42.3	18.5	14.7
Red Bluff (Tex)	307.0			88.5*
SALT AND GILA DRAINAGE				
Roosevelt	1,382.0	440.2	44.4	422.3
Horse Mesa	245.1	238.2	207.0	179.5
Mormon Flat	58.0	34.4	54.4	29.3
Saguaro	70.0	65.9	56.0	19.2
Bartlett	180.0	101.6	106.3	48.7
Horseshoe	143.0	7.0	1.8	15.5
Carl Pleasant	163.8	18 0	7.6	21.1
San Carlos	1,205.0	110.7	56.3	167.1

VALLEY PRECIPITATION[1]

Division Averages and Departures[3]

February 1, 1959

DRAINAGE DIVISIONS	Fall Sept.-Oct.-Nov. Avg.	Fall Dept.	Winter Dec. Avg.	Winter Dept.[2]
North Platte River, Wyo.	1.27	-1.47	.84	-.16
South Platte River	2.08	- .84	.71	+.23
Arkansas River	1.97	- .82	.66	-.04
Colorado River	3.32	- .90	.89	-.62
Green River, Wyo.	1.45	-1.07	.62	+.05
San Juan River, N.M.	3.40	+ .57	.33	-.35
Colorado River, Ariz.				
Gila River, N. M.	7.18	+3.19	.01	-.79
Canadian River, N.M.	2.55	-1.32	.63	+.14
Rio Grande, Colo.	2.23	- .57	.34	-.15
Rio Grande, (N), N.M.	4.11	+ .43	.24	-.66
Rio Grande (S), N.M.	4.46	-2.01	.30	-.23
Pecos River, N.M.	4.47	-1.53	.17	-.40

1/ Preliminary analysis by U.S. Weather Bureau from data furnished by Meteorological Service & U. S. Weather Bureau

2/ Departure from average

3/ Selected Stations

SNOW COURSE MEASUREMENTS

February 1, 1959

SNOW COURSE	Date	Depth 1959 Inches	Water Content In Inches 1959	1958	Avg.	Years of Record **
PLATTE RIVER DRAINAGE						
SWEETWATER RIVER						
Grannier Meadows	2/3	24	5.1	7.0	9.6	17
South Pass*	2/3	26	5.6	7.1	9.8	17
Larsen Creek	1/29	28	6.1	8.3	--	2
NO. PLATTE RIVER						
Cameron Pass (a)	1/30	54	14.9	13.2	12.5	20
Park View	1/29	25	4.7	3.7	6.0	21
Columbine Lodge	1/29	58	14.0	14.9	14.3	23
Willow Cr. Pass*	1/29	30	6.1	6.2	7.6	19
Northgate	2/2	19	4.1	2.6	4.4	9
Bottle Creek(w)	1/29	29	6.8	7.7	8.2	21
Webber Spring (w)	1/29	35	7.6	9.9	10.8	21
Old Battle (w)	1/29	51	12.8	21.1	19.2	21
N. French Creek(a,w)	1/30	57	17.1	NS	16.4	21
N. Barrett Creek(a,w)	1/30	51	14.7	14.1	11.6	21
Ryan Park (a)(w)	1/30	23	6.9	7.1	6.8	21
Spring Creek(w)		Dropped				
Albany (w)	1/27	37	9.6	9.1	9.6	10
LaBonte (w)	1/ 27	13	2.6	3.0	4.2	10
Boxelder (w)	2/3	17	3.5	3.4	3.1	8
LARAMIE RIVER						
Roach (a)	est	48	12.0	10.1	10.7	17
Deadman Hill* (a)	1/30	43	11.1	9.2	7.3	15
McIntyre		NS	NS	NS	--	
Brooklyn Lake (w)	1/26	48	13.8	13.0	13.6	21
Fox Park (w)	1/30	20	4.7	4.1	4.0	22
Pole Mtn.* (w)	1/27	15	2.8	1.6	3.1	22
Libby Lodge (w)	1/26	28	6.7	6.2	6.2	21
Hairpin Turn (w)	1/26	28	7.2	6.1	7.1	21
Albany (w)	1/27	37	9.6	9.1	--	10
POUDRE RIVER						
Cameron Pass(a)	1/30	54	14.9	13.2	12.5	20
Chambers Lake	2/1	26	8.1	5.8	5.0	20
Big South	2/1	9	2.6	2.6	1.7	20
Deadman Hill(a)	1/30	43	11.1	9.2	7.3	15
Lake Irene*	Est.	46	12.0	14.8	13.4	20
Hour Glass Lake		NS	NS	2.6	--	
Red Feather	1/30	20	5.1	2.8	5.2	10
Lost Lake	2/1	35	10.3	7.7	7.0	8
BIG THOMPSON RIVER						
Lake Irene*	Est.	46	12.0	14.8	13.4	20
Hidden Valley	1/29	31	7.9	4.8	7.8	18
Deer Ridge	1/28	18	4.2	1.6	3.2	10
Longs Peak	1/31	29	7.1	4.5	7.0	8
Two-Mile	1/29	37	9.4	7.1	--	6
ST. VRAIN RIVER						
Wild Basin	Est.	39	8.6	6.0	8.6	21
Copeland Lake	1/28	13	3.4	2.3	4.0	10
Ward	1/30	24	7.0	2.6	3.9	9
BOULDER CREEK						
University Camp	1/30	60	19.9	10.7	11.5	20
Moffat	1/30	38	12.2	5.9	5.2	9
Boulder Falls	1/30	40	12.4	5.0	--	6

* On adjacent drainage

** Averages for courses with less than 15 years of record during the period 1938-52 are partially estimated.

NS No Survey

(a) Air observed

(w) Wyoming

SNOW COURSE	Date	Depth 1959 Inches	Water Content In Inches 1959	1958	Avg.	Years of Record **
PLATTE RIVER DRAINAGE						
CLEAR CREEK						
Loveland Pass	1/27	33	7.9	6.3	8.3	19
Grizzly Peak*	1/27	38	8.0	10.4	11.3	17
Empire	1/29	23	5.4	NS	4.7	9
Berthoud Falls	1/29	35	9.4	5.0	8.7	8
Clear Creek	1/29	41	9.4	7.4	9.5	7
SOUTH PLATTE RIVER						
Hoosier Pass	1/30	37	8.4	8.4	6.6	20
Jefferson Cr.		NS	NS	NS	4.9	19
Geneva Park	1/30	10	3.0	NS	3.0	9
ARKANSAS RIVER DRAINAGE						
ARKANSAS RIVER						
Tennessee Pass	1/29	34	6.5	5.4	5.6	23
Twin Lakes T.	1/24	27	4.9	5.6	6.9	21
La Veta Pass*	1/30	21	5.3	5.0	5.6	19
4 Mile Park	1/31	16	2.9	2.7	2.9	19
Fremont Pass	1/28	41	8.6	9.3	9.6	23
Garfield		--	--	NS	--	--
Monarch Pass	1/30	38	8.5	11.4	10.5	18
Saint Elmo (a)		NS	NS	NS	7.8	8
Timberline	2/3	52	11.9	14.1	11.0	6
East Fork	1/28	30	4.6	NS	--	6
Westcliffe		NS	NS	NS	--	4
Bourbon	2/2	23	4.7	NS	--	1
COLORADO RIVER DRAINAGE						
COLORADO RIVER (Above Glenwood Springs)						
Cameron Pass* (a)	1/30	54	14.9	13.2	12.5	20
Phantom Valley	1/29	31	8.2	5.7	6.2	22
Hoosier Pass*	1/30	37	8.4	8.4	6.6	20
Berthoud Pass	1/29	44	9.3	9.4	9.2	22
Tennessee Pass	1/29	34	6.5	5.4	5.6	22
M. Fork Camp Gr.	1/30	30	5.2	5.2	6.3	22
Fiddler Gulch	Est.	31	8.0	NS	--	--
Lulu		NS	NS	NS	--	--
Willow Creek P.	1/29	30	6.1	6.2	7.6	19
N. Inlet Grand L.	Est.	34	4.1	NS	5.8	18
Lake Irene	Est.	46	12.0	14.8	13.4	20
Arrow	1/29	36	6.4	5.7	5.8	20
Lapland	Est.	34	6.0	NS	--	--
Fremont Pass	1/28	41	8.6	9.3	9.6	23
Lynx Pass		NS	NS	NS		
Shrine Pass	1/28	40	8.2	10.7	10.5	17
Grizzly Peak	1/27	38	8.0	10.4	11.3	17
Glen-Mar Ranch	1/30	28	4.4	3.9	5.9	11
Monarch Lake	1/29	33	9.7	NS	8.1	7
Granby	2/2	23	4.6	3.7	5.1	10
Grand Lake	1/29	31	6.9	3.8	6.0	10
Berthoud Summit	1/29	48	13.4	11.0	11.0	8
Frazer View	1/29	34	6.8	NS	--	8
Gore Pass	1/30	26	5.3	5.3	6.1	7
Frisco	1/29	25	3.9	5.1	5.5	8
Snake River	1/29	26	4.2	NS	--	7
Summit Ranch	1/30	22	4.4	NS	--	5
Vail Pass	1/29	45	10.3	9.1	--	
Pando	1/29	26	4.6	NS		
Kokomo		NS	NS	5.8	--	
Milner		NS	NS	8.3	--	
Blue River	1/30	29	5.9	6.0	--	
Jones Pass		NS	NS	7.2		
Ranch Creek	1/29	31	6.5	4.5	--	
Vasquez Creek	1/29	40	8.0	6.0	--	

SNOW COURSE MEASUREMENTS

February 1, 1959

SNOW COURSE	Date	Depth 1959 Inches	Water Content In Inches 1959	1958	Avg.	Years of Record **
COLORADO RIVER DRAINAGE						
ROARING FORK						
Ind. Pass Tunnel	1/24	34	7.3	9.3	10.4	23
North Lost Trail(a)	1/30	26	5.7	NS	7.5	17
Nast		NS	NS	NS	--	--
Ivanhoe	1/29	44	8.1	9.0	11.4	13
Lift	2/2	31	6.1	NS	--	--
YAMPA RIVER						
Dry Lake	1/30	46	11.6	NS	11.9	17
Columbine Lodge*	1/29	58	14.0	14.9	14.3	23
Elk River (a)	1/30	48	12.5	NS	9.6	--
Lynx Pass*		NS	NS	NS	--	--
Routt Line		NS	NS	NS	--	--
Rabbit Ears	1/29	66	17.4	NS	--	--
Yampa View	1/29	37	8.8	NS	--	--
Hahn's Peak	1/28	34	7.5	--	--	--
Bear River		NS	NS	NS	--	--
Clark	1/28	27	6.1	NS	--	--
Old Battle	1/29	51	12.8	21.1	19.2	21
WHITE RIVER						
Burro Mountain(a)	1/30	45	11.7	15.0	10.4	23
Rio Blanco	2/1	32	8.4	10.0	9.3	19
PLATEAU CREEK						
Mesa Lakes	2/1	34	6.7	16.0	9.2	22
Trickle Divide(a)	1/30	38	9.5	19.5	15.4	14
GUNNISON RIVER						
Crested Butte	1/29	29	4.7	6.6	8.6	23
Park Cone	1/29	19	3.0	5.0	6.0	23
Alexander Lake(a)	1/30	30	6.6	15.3	13.2	22
Ironton Park	1/30	26	5.9	11.6	7.3	22
Trickle Divide(a)	1/30	38	9.5	19.5	15.9	15
Park Reservoir(a)	1/30	33	8.0	15.5	14.3	15
Porphyry Creek	1/30	35	7.5	9.8	9.6	19
Kannah Cr.			NS	NS	--	--
Lake City			NS	NS	--	--
Tomichi	1/30	26	5.4	--	--	--
Cochetopa Pass*	1/26	18	3.4	4.3	3.6	10
McClure Pass(a)	1/30	32	7.7	NS	--	--
Red Mt. Pass		NS	NS	NS	--	--
Blue Mesa		NS	NS	NS	--	--
SAN JUAN RIVER						
Wolf Creek Pass*	1/29	28	6.4	16.7	17.6	19
Upper San Juan	1/29	33	8.4	21.6	20.0	19
Granite Peaks	2/1	5	0.2	4.5	5.6	17
La Plata		NS	NS	NS	--	--
Wolf Creek Summit	1/29	25	6.3	20.1	16.0	8
Chama Divide*	2/2	6	0.6	3.3	4.4	19
Chamita*	2/2	17	1.9	4.8	7.0	17
ANIMAS RIVER						
Silverton Sub. S.		NS	NS	NS	--	
Ironton Park*	1/30	26	5.9	11.6	7.3	22
Cascade	1/30	9	2.2	7.9	8.2	20
Spud Mt.	1/30	22	6.0	18.7	17.0	8
Molas Lake	1/30	13	3.2	10.3	11.1	8
Howardville		NS	NS	NS	--	--
Mineral Creek		NS	NS	NS	--	--
Red Mt. Pass*		NS	NS	NS	--	--

SNOW COURSE	Date	Depth 1959 Inches	Water Content In Inches 1959	1958	Avg.	Years of Record **
COLORADO RIVER DRAINAGE						
DOLORES RIVER						
Rico	1/30	3	0.5	5.2	6.4	19
Telluride	2/1	20	2.8	6.2	5.2	20
Lizard Head	1/30	21	4.8	NS	--	--
Trout Lake	1/31	28	3.5	8.3	8.8	10
SAN RAFAEL RIVER						
Hntngtn-Horseshoe		NS	NS	19.3	--	8
Seeley Creek R.S.		NS	NS	NS	--	--
VIRGIN RIVER						
Long Valley Jnct.	1/28	0	0.0	0.8	4.4	7
Harris Flat R.S.	1/28	3	0.7	4.8	6.6	13
Duck Creek R.S.	1/28	2	0.5	8.6	10.1	15
Cedar Breaks		NS	NS	NS	--	--
Webster Flats	1/28	13	2.4	10.7	11.8	7
COLORADO R. (S. E. UTAH)						
LaSal Mt.		NS	NS	NS	--	--
Buckboard Flat		NS	NS	NS	--	--
PRICE RIVER						
Indian Canyon*	1/29	14	2.4	7.2	6.9	23
Gooseberry Res.	1/27	22	5.1	12.3	13.6	8
Staley Ranch	1/27	6	1.0	5.6	5.5	17
Dry Valley Divide	1/27	11	2.1	7.6	7.3	17
Hntngtn-Horseshoe		NS	NS	NS	--	--
Mud Creek	1/28	17	3.1	8.8	--	3
DUCHESNE RIVER						
Lake Fork Mt.	1/28	16	3.4	8.5	8.7	8
Paradise Park	1/27	14	2.1	8.4	8.6	6
Mosby Mt. (L)	1/27	10	1.5	6.8	7.2	6
Brown Duck Lake		NS	NS	NS	--	--
Indian Canyon	1/29	14	2.4	7.2	6.9	23
UPPER GREEN RIVER (UTAH)						
Hewinta R.S.		NS	NS	NS	--	--
Hole-in-Rock		NS	NS	NS	--	--
King's Cabin (U)		NS	NS	NS	--	--
King's Cabin (L)		NS	NS	NS	--	--
GREEN RIVER (WYOMING)						
Dutch Joe (w)	1/28	27	5.3	6.6	--	3
Mulligan Park (w)	1/26	5	5.9	6.4	--	3
Kendall R.S. (w)	1/27	27	6.1	5.8	--	3
Loomis Park (w)	1/27	42	10.2	NS	--	3
Snyder Basin R.S.(w)	1/29	39	9.3	NS	--	1
Piney-LaBarge (w)	1/29	44	11.4	NS	--	1
GILA RIVER						
Frisco Divide	1/28	1	0.5	1.8	2.1	21
State Line	1/27	0	0.0	1.8	2.9	21
Taylor Creek	1/29	0	0.0	0.0	0.6	17
Inman	1/28	0	0.0	0.0	0.5	13
Nutrioso	1/27	0	0.0	T	2.5	21
Beaver Head		NS	NS	T	3.0	19
Coronado Trail	1/30	0	0.0	0.0	3.7	21
Rose Canyon	1/30	0	0.0	--	1.6	11
Bear Wallow	1/30	0	0.0	--	3.0	11

* On adjacent drainage

** Averages for courses with less than 15 years of record during the period 1938-52 are partially estimated.

NS No Survey

(a) Air observed

(w) Wyoming

SNOW COURSE MEASUREMENTS

February 1, 1959

SNOW COURSE	Date	Depth 1959 Inches	Water Content In Inches 1959	1958	Avg	Years of Record **
COLORADO RIVER DRAINAGE						
SALT RIVER						
Forest Dale	1/27	0	0.0	0.0	1.2	19
McNary	1/27	0	0.0	0.0	3.0	20
Nutrioso	1/28	0	0.0	0.0	2.5	.
Coronado Trail	1/27	0	0.0	0.3	3.7	21
Milk Ranch	1/29	0	0.0	0.0	1.9	18
Workman Creek	1/29	2	0.4	T	3.4	7
Maverick Fork	1/29	0	0.0	4.4	6.4	7
Baldy	1/29	T	T	3.2	5.5	8
Fort Apache	1/30	11	2.4	2.9	5.7	7
Pacheta	1/27	0	0.0	0.0	2.7	9
VERDE RIVER						
Iron Springs*	1/27	0	0.0	0.0	1.7	13
Camp Wood	1/28	0	0.0	0.0	1.5	12
Mingus Mountain	1/28	0	0.0	0.0	1.7	12
Mormon Lake*	1/28	0	0.0	0.0	5.1	11
Fort Valley*	1/29	0	0.0	T	2.9	12
Chalendar*	1/29	0	0.0	0.0	3.4	12
Munds Park	1/29	0	0.0	0.0	2.4	8
Casner Park	1/29	0	0.0	0.0	3.9	8
Mormon Mt.	1/30	0	0.0	0.0	4.8	8
Happy Jack	1/30	0	0.0	0.0	3.4	5
LITTLE COLORADO RIVER						
Forest Dale*	1/30	0	0.0	0.0	1.2	19
McNary	1/29	0	0.0	0.0	3.0	20
Nutrioso*	1/27	0	0.0	0.0	2.5	21
Mormon Lake	1/27	0	0.0	T	5.1	11
Fort Valley	1/28	0	0.0	0.0	2.9	12
Mormon Mt.	1/28	0	0.0	T	4.8	8
Happy Jack	1/28	0	0.0	0.0	3.4	5
Gentry	1/27	0	0.0	T	2.9	8
Heber	1/27	0	0.0	T	3.1	8
Canyon Creek	1/28	0	0.0	T	--	--
WILLIAMS RIVER						
Iron Springs	1/30	0	0.0	T	1.7	13
Camp Wood*	1/30	0	0.0	0.0	1.5	13
Willow Ranch	1/30	0	0.0	NS	0.8	10
LOWER COLORADO RIVER						
Bright Angel		NS	NS	4.5	7.8	11
Grand Canyon	1/30	0	0.0	0.7	2.6	11
Fort Valley	1/29	0	0.0	0.0	2.9	12
Chalender	1/29	0	0.0	T	3.4	12
RIO GRANDE DRAINAGE						
RIO GRANDE IN COLORADO						
Wolf Creek Pass	1/29	28	6.4	16.7	17.6	19
Upper Rio Grande	1/30	17.	1.9	8.2	5.3	19
Santa Maria	1/30	10	1.6	4.5	3.8	20

SNOW COURSE	Date	Depth 1959 Inches	Water Content In Inches 1959	1958	Avg.	Years of Record **
RIO GRANDE DRAINAGE						
RIO GRANDE IN COLORADO						
Pyramid		NS	NS	NS	--	--
Spring Creek		NS	NS	NS	--	--
Pool Table		NS	NS	NS	--	--
L. Humphreys		NS	NS	NS	--	--
Cochetopa Pass	1/26	18	3.4	4.3	3.6	10
Red Mt.		NS	NS	NS	--	--
Porcupine		NS	NS	NS	--	--
Wolf Creek Summit	1/29	25	6.3	20.1	16.0	8
Hiway	1/29	21	4.9	16.6	--	3
Pass Creek	1/29	10	2.4	9.3	--	3
ALAMOSA RIVER						
Silver Lakes	1/30	8	1.2	4.0	4.7	19
Summitville	Est.	20	4.8	11.3	11.3	14
CONEJOS RIVER						
River Springs		NS	NS	3.0	6.0	18
Cumbres Pass(a)	2/4	44	8.9	10.2	13.7	20
Platoro		NS	NS	NS	--	--
West Conejos		NS	NS	NS	--	--
La Manga (a)	2/4	48	10.1	13.1	--	8
SANGRE DE CRISTO RANGE (COLORADO)						
LaVeta Pass	1/30	21	5.3	5.0	5.6	19
Culebra		NS	NS	NS	6.9	19
CHAMA RIVER						
Cumbres Pass (a)	2/4	44	0.9	10.2	13.7	20
Payrole (a)	2/4	25	4.8	8.1	7.1	18
Chama Divide	2/2	6	0.6	3.3	4.4	19
Chamita	2/2	17	1.9	4.8	7.0	17
Bateman		NS	NS	NS	--	9
PECOS RIVER						
Panchuela	2/2	4	0.8	NS	3.1	20
Big Tesuque	1/30	7	2.5	5.0	4.4	17
Rio En Medio*	1/30	12	4.8	6.3		9
RIO GRANDE IN NEW MEXICO						
Red River		--	--	NS	5.4	18
Taos Canyon	2/2	11	3.9	3.7	4.7	19
Aspen Grove		NS	NS	3.9	3.8	20
Hematite Park*		--	--	5.4	3.7	18
Tres Ritos	2/2	15	2.9	4.3	4.5	20
Payrole (a)	2/4	25	4.8	8.1	7.1	18
Cordova (a)	2/4	30	5.7	10.5	7.1	17
Big Tesuque	1/30	7	2.5	5.0	4.4	17
Elk Cabin	2/3	5	1.4	3.8	--	11
Rio En Medio	1/30	12	4.8	6.3		9
Quemazon		NS	NS	NS	--	--
Fenton Hill	2/2	6	1.1	5.1		7
CANADIAN RIVER						
Hematite Park		--	--	5.4	3.7	18
Tres Ritos	2/2	15	2.9	4.3	4.5	20
Cordova (a)	2/4	30	5.7	10.5	7.1	17

* On adjacent drainage

** Averages for courses with less than 15 years of record during the period 1938-52 are partially estimated.

NS No Survey

(a) Air observed

Federal - State - Private
COOPERATIVE SNOW SURVEYS

—

Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation, navigation, mining and industry

"The Conservation of Water begins with the Snow Survey"